

Current Comments®

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Some Verses by Chemist/Poet Roald Hoffmann and His Foreword to Volume 12 of *Essays of an Information Scientist*

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An Unusual State of Matter

for John M. Thomas

*In the beach sands of Kerala,
abraded from the gneiss,
in the stream sands of North Carolina
one finds monazite, the solitary
mineral. In its crystalline beginning
there was order, there was a lattice.
And the atoms—cerium, lanthanum,
thorium, yttrium, phosphate—danced
round their predestined sites,
tethered by the massless springs
of electrostatics
and by their neighbors' bulk.*

*They vibrated,
and sang
in quantized harmony
to absent listeners, to me.*

*But the enemy is within.
The radioactive thorium's
nervous nuclei explode
in the random thrum
of a hammer
of no Norse god.*

*The invisible searchlights
of hell, gamma rays,
flash down the lattice.
Alpha particles, crazed nuclear
debris, are thrust on megavolt
missions of chance destruction.
The remnant atom, transmuted, recoils,
freeing itself from its lattice point,
cannonballs awry through
a crowded dance floor.
There are no exits to run to.
In chain collisions of disruption
neighbors are knocked from their sites.
The crystal swells from once limpid
long-range, short-range order
to yellow-brown amorphousness.
Faults,
defects,
vacancies,
dislocations,
interstitials,
undefine the metamict state.¹*

I first became familiar with Roald Hoffmann's poetry when we discussed the science/poetry connection several years ago.² "An Unusual State of Matter" is the last entry in his first book of poems entitled *The Metamict State*.¹ Over the years, he and I have become good friends. Not long after I lectured at Cornell University last year, I asked Roald if he would write the foreword to the next volume of my *Essays of an Information Scientist*. That playful foreword is reprinted below.

Choosing a title for a volume that covers such a wide variety of topics is a difficult exercise. Just as the title of a book of poems cannot fully reflect its content, neither can a reasonably short title for a collection of essays. Nevertheless, the subject of creativity, both in science and the humanities, has been a regular theme of my essays for years, particularly in 1989, the period covered by volume 12. Hence the title *Essays of an Information Scientist: Creativity, Delayed Recognition, and Other Essays*.³

The publication of these volumes began in 1977. That year, two volumes covered the essays published from 1962 to 1976. At first these essays appeared intermittently—then weekly from 1970 onward. Volumes 3 through 5 each covered two years of *Current Comments*® between 1977 and 1982. From then on, an annual volume, including indexes, has been published.

As indicated in my preface to the collection, there are dozens of topics covered in this volume besides creativity and delayed recognition. One of my favorites discussed the creativity of jazzman Rudy Wiedoeft and *Saxophobia*.⁴ And naturally several essays involved citation analyses.

I have never been reluctant to take advantage of the wellspring of talents of esteemed colleagues. This volume contains essays by friends like Joshua Lederberg,⁵⁻⁸ Harriet Zuckerman,^{6,9} Carl Djerassi,¹⁰ Rudolf Schmid,¹¹ and Bernard Dixon.^{12,13}

There also are tributes to several others—among them Marjory Stoneman Douglas on celebrating her 99th birthday¹⁴ and to Manfred Kochen¹⁵ on his untimely death that year.

The constructive use of citation analysis is illustrated in essays by economist Arthur Diamond^{16,17} and information scientists Jean King,¹⁸ Belver Griffith,¹⁹ and Raymond McInnis.²⁰ The need to recognize science education as a major problem in America was discussed²¹ and is certainly a subject that needs continued coverage. Among other topics covered that year were marine science journals,²² humor in science,¹¹ the Nobel Prizes,²³⁻²⁶ and the notion of establishing a science court.²⁷

Naturally the new services launched by ISI® that year, such as *Current Contents on Diskette*®²⁸ and the *Social Sciences Citation Index*® *Compact Disc Edition*,²⁹ were reviewed in detail. Since then, I've provided updates covering developments like *KeyWords Plus*™^{30,31} and *Current Contents on Diskette with Abstracts*.³²

The Poet/Chemist Roald Hoffmann

Roald Hoffmann shared the 1981 Nobel Prize with Kenichi Fukui of Japan, although

each had done his work independently. Hoffmann was recognized for his development of the theory of electronic orbitals in chemical reactions.³³ The theory has become an exceedingly practical instrument for a wide variety of chemical syntheses, helping to define the obstacles and preferred paths of chemical reactions.

Hoffmann was born in Poland, but, after escaping the Holocaust, his family emigrated to the US. He attended Stuyvesant High School and Columbia University in New York, then did his graduate work at Harvard. He is now a distinguished professor at Cornell University, Ithaca, New York, where he gives an introductory course in chemistry attended by some 850 students. He also teaches theoretical chemistry. His mentors were Nobel laureates Robert Burns Woodward and William N. Lipscomb. In 1962, Hoffmann and Lipscomb coauthored a *Citation Classic*® on the theory of polyhedral molecules that has been cited more than 700 times.³⁴ Indeed, Hoffmann has coauthored two *Citation Classic* commentaries in *Current Contents*®.^{35,36} One, a paper dealing with an extended Hückel theory, has been cited more than 3,000 times.³⁵

"Hoffmann's [theories] bridged the gap between quantum theory and practical chemistry, enabling the prediction of possible products and reaction conditions by (as *The New York Times* described it) jotting pictures on the back of an envelope."³⁷

In addition to the Nobel Prize, Hoffmann received the 1990 Priestley Medal, the highest honor of the American Chemical Society. He is the only person in the history of the society to be honored in both organic and inorganic chemistry. He also is accomplished in solid-state chemistry.

When Nazi Germany invaded Poland in 1941, Hoffmann's family was imprisoned in a forced labor camp. In 1943, young Roald and his mother were smuggled out of the camp. They were hidden in an attic by a Ukrainian family until the end of the war. His father, Hillel Safran, who arranged for his son's escape, and many other members of the family were executed by the Nazis. Roald was five at the time. Only 80 of

12,000 Jews in his hometown of Zloczow survived the war.

Hoffmann's introduction to poetry began at Columbia University under Mark Van Doren, the celebrated teacher and critic. He began to write poetry in the 1970s and maintains an interest in German and Russian literature as well. His second book of poetry, *Gaps and Verges*, was published in 1990.³⁸

The first poem in that collection, "Evolution," is reprinted below. Many of the poems in it were written at the art colony in California known as the Djerassi Foundation, named after another poet/chemist. Carl Djerassi is, of course, the author of the novel *Cantor's Dilemma*³⁹ and the more recent book of poems *The Clock Runs Backward*.⁴⁰

"Evolution"

*I had written three pages
on how insects are such good chemists,
citing
the silkworm sex attractant,
and the bombardier beetle,
spraying out hot hydrogen peroxide when
threatened.
And I was in the middle
of telling the story of the western pine
beetle,
which has an aggregation pheromone
calling all comers (of that species).
The pheromone has three components:
one from the male, frontalin,
exo-brevicomin wafted by the female
and (ingenious)
abundant, pitch-smelling myrcene
from the host pine.
I had written this the night before,
broken it down into short lines.
When I woke up Sunday and sat down to
work,
quietly, with a second cup of coffee,*

*the sun was on my desk.
I had some flowers I had picked on the hill
in a vase: bush lupine, California poppies,
and some of the grass that grows here.
On the grass stalks the bracts were a few
centimeters apart.
They were beige, finely lined husks,
their line set by a dark spikelet,
more like a stiffened flagellum than a
thorn.
A hint of something feathered inside.
The sun's warmth had burst some of the
pods,
which had fallen on the draft
(the words were lost in the sun), fallen
by chance next to the shadows of seed still
hanging, and,
the grass seed,
like dormant grasshoppers,
legs of now bent spikelets
cast second, finer shadows.
Then I saw you walking on the hill.³⁸*

* * * * *

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Foreword

Roald Hoffmann

The other day I tried to imagine a world without Gene Garfield. Oh, he'd still be with us, but let's say Dr. Garfield turned out to be a great organic chemist instead of what he is. In that world, I'd saunter into the library on a Saturday afternoon, as I've done for twenty five years. I'd glare at the undergraduates with their feet up on the table near the new journals, those 250 multicolored objects of my obsession, bringing the week's good news to Cornell. Actually that Saturday afternoon there's a football game, so there's a little less competition between the undergraduates and professors for the space of many uses in Clark Hall Physical Sciences Library.

I sit myself down, in that Gene-less world, and begin to look through the journals. I scan the titles, read some abstracts, read in more detail a few pieces of a paper, put aside a handful of articles to copy, hoping against hope that one of the five copying machines has survived a day's abuse. In one issue of *Recueil des Travaux Chimiques des Pays Bas* (I've heard boorish Americans call it the Records of the Traveling Chemists), there is an article reporting calculations on a fascinating cyclopentadienyl thallium complex. But that day something happens—I'm distracted, perhaps by the view across Cayuga Valley, or tired from too much country and western dancing, so I drift as I scan down the pages. The contents don't register.

I miss the article. Which is too bad, because it's relevant, terribly relevant to work Chris Janiak, a German postdoctoral associate and I are doing on thallium and indium



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chemistry. In fact, I don't find the article until a year and a half later, after we've written ours on the subject, when a critical commentator arguing with our interpretation points to this Dutch article and I get the shock, full impact, of not searching the literature, the shock, reverberating back to childhood, of not having done my homework.

In that world there is no *Current Contents*. There is no redundancy mechanism to provide me with another chance to make up for my moment of distraction, a second scan through the riches of the chemical literature.

Then there is this insubordinate graduate student in my group. She had her own way of doing research, and resists my gentle attempts to impose a paradigm. I tell her you should really know the experimental literature of the field before you build an orbital

theory. She says "Ah, hell, let's do a calculation and see if the results are interesting, then we'll look if anyone has made the relevant molecules." I view this curious philosophy as a modern day perversion of the notorious Dirac fallacy of following the beauty of the equations, experiment be damned. I fight back, showing her examples from the literature that violate her orbital interaction diagrams, and in my real world I have a trick for finding these (and I *will* share it with her soon), namely *Citation Index*. We're working on explaining a molecule with a weird geometry, first seen a dozen years ago and still a puzzle today. It's so easy to trace all the papers that reference a key finding of an anomaly, that spot the same paper that she and I took off from. The true value of this creation of Gene's is that it is a bibliographic tool, not a servant of vanity, nor a meterstick for promotion. In the ISI-less world, I have a harder time keeping ahead of my student.

It would be a dull world without Gene Garfield's essays. Where else could I see Joshua Lederberg and Harriet Zuckerman looking toward the space separating them, while discoursing on the postmature nature of the discovery of bacterial sex; get some name-dropping mileage among my jazzy friends out of Rudy Wiedoeft (one also learns there is a World Saxophone Congress every three years—I wonder if they have parallel sessions and if their meeting rooms are sound-proofed better than those of the chemists); where else would I see such deft side-stepping to explain why the work of Gertrude Elion and George Hitchings, who shared the 1988 Nobel Prize in Medicine,

never appeared on lists of most cited papers; learn who taught Mister Rogers to fly; and find out that Gene, Josh, and I were all Peglegs.

And what would I do if I could not look forward to the fourth fifty most cited scientists in 1973-84? I mean, here the first one hundred and fifty have passed, and I'm not on the list! I have my asterisk, and yet I'm not on *his* list. Mind you there are scores of those perfervid molecular biologists, medicos, and their ilk, the same crew that's swamped *Proc. Nat. Acad. Sci. USA* (ISI Accession Number DG 092) taking up most of the space on that list. I bet they're all just citing each other, a thing my chemist friends would *never* dream of doing. They just cite themselves. But the ignominy of it all—Michael J. made the top 150, and I haven't!

In that deprived world no one would call me to pontificate as to why Soviet physics papers are their most cited literature component, or ask me to pronounce (by Federal Express, please) *ex cathedra* of what this highly cited chemistry paper is a harbinger. Of fashion, that's what. Gene certainly has a way to a man's heart. Even if my picture isn't there as often as Josh's, he's helped me make the middle-aged transition from *wunderkind* to sage.

I much prefer this world, where Eugene Garfield and his brainchildren entertain and inform us. Welcome to his essays!

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